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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/615,800	07/10/2003	Shinji Kobayashi	240043US2	1909
22850	7590	09/07/2004	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			EDWARDS, LAURA ESTELLE	
			ART UNIT	PAPER NUMBER
			1734	

DATE MAILED: 09/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/615,800	Applicant(s) KOBAYASHI ET AL.	
	Examiner Laura E. Edwards	Art Unit 1734	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 11-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Election/Restrictions

Applicant's election with traverse of Group, I, claims 1-10 in the reply filed on 7/20/04 is acknowledged. The traversal is on the ground(s) that the search required for both inventions, the apparatus and the method are the same such that no undue burden would be placed on the Examiner in examining all the claimed inventions. This is not found persuasive because the search for the method of Group II is different than for the apparatus of Group I as shown in by the different classifications indicated in the previous office action. An undue burden would be placed on the Examiner because searching of the two different inventions of Group I alone requires review of different classes alone in a substantially limited amount of examination time.

The requirement is still deemed reasonable, proper, and is therefore made FINAL.

Claim Rejections - 35 USC § 112

Claims 3 and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 3, it is unclear how timing is set without a timing means being recited. This claim appears to recite a process limitation.

In claim 10, it is unclear how the solvent being set as claimed further structurally limits the apparatus. This appears to be a process limitation because no structure is recited to effect said function.

Claim Rejections - 35 USC § 103

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over the ASPA (Admitted State of the Prior Art) in view of Miyakawa et al (US 6,473,995).

The ASPA teaches providing an airtight or vacuum chamber in which a substrate is mounted, a straightening vane is provided facing the mounted substrate, the straightening vane having a size the same or larger than the area of the substrate, means for evacuating or reducing pressure in the chamber, and exhaust flow rate regulating means (i.e., pressure regulating valve) for regulating the flow of vacuum (see Fig. 10 and instant specification, page 1, lines 11 to page 3, line 18). The ASPA is silent concerning a flow rate controller for controlling the exhaust flow rate and varying said flow rate in at least two steps so as to remove solvent from the coating liquid and thereby dry the coated substrate. However, it was known in the art at the time the invention was made, to connect a flow rate controller to a vacuum chamber to control the exhaust flow rate and vary the flow rate in at least two steps so as to remove solvent from

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coating liquid and thereby dry a coated substrate in less time as evidenced by Miyakawa et al (see col. 4, lines 66 to col. 5, lines 1-6 and col. 5, lines 53 to col. 6, lines 1-12). It would have been obvious to one of ordinary skill in the art to provide a flow rate controller as taught by Miyakawa et al in the apparatus defined by the combination in order to remove solvent and dry the coated substrate in less time which in return would lower manufacturing costs.

With respect to claim 2, the exhaust flow rate is lowered in steps and then raised as evidenced by Miyakawa et al (see col. 5, lines 53 to col. 6, lines 1-12).

With respect to claims 3 and 4, even though the ASPA is silent concerning timing of the vacuum process, Miyakawa et al recognize the timing (i.e., t1 to t3) of the vacuum drying process (via means not shown) as a means for measuring progress in the drying of a given coated substrate as evidenced by all the examples. It would have been obvious to one of ordinary skill in the art to provide timing of the drying process as a way of measuring progress of drying of various coated substrates.

With respect to claim 5, the ASPA is silent concerning a pressure detecting means for detecting pressure in the vacuum chamber and then controlling the vacuum exhaust rate based on pressure detection. However, it was known in the art at the time the invention was made to provide pressure detection means (i.e., vacuum degree detection signal) connected to a vacuum chamber and then control the vacuum chamber exhaust rate based on the detected pressure as evidenced by Miyakawa et al (see col. 5, lines 1-6). It would have been obvious to one of ordinary skill in the art to provide a pressure detection means in communication with the flow rate controller in the apparatus defined by the combination so as to control the vacuum chamber exhaust rate based on the detected pressure and allow for automatic shut off when desired.

Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takamori et al (US 6,261,007) in view of the ASPA (Admitted State of the Prior Art).

Takamori et al teach a substrate processing apparatus comprising a cassette mount portion (C) in which a cassette storing a plurality of substrates is loaded; a coating unit (CT) applying a coating liquid to the substrate; a drying unit (VD) for drying a coated substrate via reduced pressure, the drying unit including an airtight container having a substrate mount portion for the substrate to be treated in a pressure-reduced atmosphere; means for evacuating and reducing pressure the apparatus, and an atmospheric controller for controlling the atmosphere in each unit wherein the coated substrate is capable of being dried at two different exhaust flow rates, and loading and unloading means (i.e., robotic arms) for taking a substrate out of the cassette and carrying said substrate to a giving processing unit. Takamori et al are silent concerning the use of a straightening vane in the apparatus. However, it was known in the art, at the time the invention was made, to provide in a substrate processing apparatus, a straightening vane having a size the same or larger than the area of the substrate container spaced above a substrate so as to establish a uniform exhaust stream on the surface of a substrate being vacuum dried as evidenced by the ASPA (see Fig. 10 and instant specification, page 1, lines 11 to page 3, line 18). It would have been obvious to one of ordinary skill in the art to provide a straightening vane as taught by the ASPA in the apparatus of Takamori et al in order to provide for uniform exhaustion of solvent from the surface of a coated substrate.

With respect to claim 10, this claim while considered has been given no patentable weight because a process limitation is recited.

Allowable Subject Matter

Claims 6-8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 6 would be allowable because there is no teaching or suggestion in the prior art of an apparatus for drying comprising the combination of an airtight container in which a substrate mount portion for mounting a liquid coated substrate is provided to place the substrate in the pressure-reduced atmosphere; a straightening vane provided so as to face a surface of the substrate mounted on said substrate mount portion with a gap interposed, and having a size the same as or larger than an effective area of the substrate; means for evacuating and reducing pressure in said airtight container; an exhaust flow rate regulating portion for regulating a flow rate of an exhaust for pressure reduction; and a control portion outputting a flow rate set value for said exhaust flow rate regulating portion, and varying the flow rate set value at least in two steps while the solvent is actively evaporating from said coating liquid wherein the control portion stores data corresponding to a pattern of the flow rate set value while the solvent is actively evaporating from the coating liquid for each type of coating liquid.

Claim 7 would be allowable because there is no teaching or suggestion in the prior art of an apparatus for drying comprising the combination of an airtight container in which a substrate mount portion for mounting a liquid coated substrate is provided to place the substrate in the pressure-reduced atmosphere; a straightening vane provided so as to face a surface of the substrate mounted on said substrate mount portion with a gap interposed, and having a size the same as or larger than an effective area of the substrate; means for evacuating and reducing

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pressure in said airtight container; an exhaust flow rate regulating portion for regulating a flow rate of an exhaust for pressure reduction; and a control portion outputting a flow rate set value for said exhaust flow rate regulating portion, and varying the flow rate set value at least in two steps while the solvent is actively evaporating from said coating liquid wherein the control portion stores data corresponding to a pattern of the flow rate set value while the solvent is actively evaporating from the coating liquid for each film thickness of the coating liquid.

Claim 8 would be allowable because there is no teaching or suggestion in the prior art of an apparatus for drying comprising the combination of an airtight container in which a substrate mount portion for mounting a liquid coated substrate is provided to place the substrate in the pressure-reduced atmosphere; a straightening vane provided so as to face a surface of the substrate mounted on said substrate mount portion with a gap interposed, and having a size the same as or larger than an effective area of the substrate; means for evacuating and reducing pressure in said airtight container; an exhaust flow rate regulating portion for regulating a flow rate of an exhaust for pressure reduction; and a control portion outputting a flow rate set value for said exhaust flow rate regulating portion, and varying the flow rate set value at least in two steps while the solvent is actively evaporating from said coating liquid wherein the control portion stores data corresponding to a pattern of the flow rate set value while the solvent is actively evaporating from the coating liquid for each combination of the type and the film thickness of the coating liquid.


Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following patents disclose the state of the art with respect to vacuum substrate drying systems: Karamatsu et al (US 6,151,796) and Kawakami et al (US 6,364,953).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Laura E. Edwards whose telephone number is (571) 272-1227. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chris Fiorilla can be reached on (571) 272-1187. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Laura E. Edwards
Primary Examiner
Art Unit 1734

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September 3, 2004